ARTIFICIAL INTELLIGENCE AS A PARADIGM OF MODERNIZATION: CONDITIONS, PERCEPTION, AND RISKS (AN INTERDISCIPLINARY APPROACH)*

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Abstract. The problematics of artificial intelligence (AI) have become a topical subject in scientific and socio-political discourse, as well as in everyday practice. The rapid pace of digitalization and the widespread adoption of AI are fundamentally transforming societies, economies, and individual lives. The paradigm of AI is being shaped within an interdisciplinary scientific discourse, which unfolds not only in the technological but also in the socio-humanitarian dimensions. The integration of digital technologies into all spheres of social life generates a wide range of issues in socio-cultural, economic, political, psychological, ecological, legal, and ethical aspects. At the personal level, AI technologies provide comfortable living conditions while simultaneously creating human dependence on digital reality, which can significantly influence individual identity. Alongside unprecedented opportunities, the digital transformation of society also brings about challenges and risks that require thorough analysis and the development and implementation of practical algorithms at the state level. Based on discourse analysis of scientific and official sources, as well as an interdisciplinary approach to interpreting sociological measurements of digitalization in Kazakhstan, the article presents relevant contexts for the formation of the national AI paradigm.

Keywords: artificial intelligence (AI), information and communication technologies (ICT), Kazakhstan, modernization, risks, digital society

Introduction

Digital systems and artificial intelligence (AI) have become key factors of sustainable development and guarantees of state sovereignty, serving as driving forces of economic growth and conditions for survival in global competition. In the coming

three years, Kazakhstan is expected to achieve tangible results in digital development [1]. The priority directions of Kazakhstan's digital transformation are linked to the pivotal role of AI, which has emerged as a transformative force offering enormous potential for societal progress while simultaneously posing significant risks that require careful examination and proactive governance.

To ensure the sustainable functioning of society, the Kazakhstani state provides institutional and technological conditions for the development of AI, encouraging its implementation across various sectors. The development of the national digital law has been completed; its adoption will necessitate a systematic approach to incorporating AI-related concepts into different codes – including labor, criminal, and administrative law, as well as sectoral legislation in medicine, finance, education, and other fields.

The forthcoming Law of the Republic of Kazakhstan on Artificial Intelligence (2025) declares the need to regulate social relations in the field of AI that arise within the territory of the Republic of Kazakhstan among governmental bodies, individuals, and legal entities. The state defines the legal and organizational foundations to ensure transparency, safety, and government support for AI development [2].

Scholars are faced with the task of interdisciplinary conceptualization of the AI paradigm in Kazakhstani society. The authors regard it as a metaparadigm – a framework integrating technological, social, legal, ethical, and humanitarian dimensions necessary for the conflict-free and secure functioning of the information environment.

Contours of the Metaparadigm of the Digital Society in Its Technological Aspects The contours of the digital society's metaparadigm in its technological aspects are reflected in the Information Doctrine of the Republic of Kazakhstan [3] and the Law of the Republic of Kazakhstan on Artificial Intelligence [2]. The key definitions of AI in governmental documents emphasize the technical and technological parameters of this phenomenon. An AI system is positioned as an object of informatization that operates on the basis of artificial intelligence. The National AI Platform is defined as a technological platform designed for the collection, processing, storage, and dissemination of data libraries and for providing services in the field of artificial intelligence.

A data library is understood as a collection of structured and/or grouped data sets. A generative AI system is conceptualized as an AI system that produces synthetic outcomes of AI activity, including the modification of biometric data (such as changes in voice, facial images, video footage, movements, etc.), the alteration of reality, and the execution of other similar actions. A user of an AI system or of its outcomes is identified as a person who employs the AI system to perform a specific function and/or task, or who makes use of its results. The output of an AI system refers to information- regardless of its form of representation – or to actions, including works and services produced and/or delivered by the AI system [2].

Evidently, the definitions of AI formulated in these documents, along with its systemic characteristics, reflect solely technological parameters and exhibit a degree of tautology. Conceptual definitions of AI and the study of its effectiveness in comparison with the essential capacities of the human being represent only some aspects of the philosophical comprehension of this phenomenon. An interdisciplinary scientific discourse is required for the conceptualization of AI in relation to the realities of digital society development in Kazakhstan, a process that finds its empirical dimension in sociological research.

Methodology

The methodology of the study is based on discourse analysis of scientific and official sources devoted to the formation and development of the digital society in Kazakhstan, as well as on data obtained from the sociological research "Kazakhstani Society under the Conditions of Digital Transformation," conducted by BRIF Resource Group at the request of the Institute of Philosophy, Political Science, and Religious Studies of the Committee of Science of the Ministry of Science and Higher Education of the Republic of Kazakhstan in 2024.

The target participants of the sociological research were as follows:

– The mass survey included men and women aged 18 and older who had been residing in the region for more than six months and were selected based on data from the Bureau of National Statistics as of early 2023. A stratified random probability sampling method was used, with stratification by gender, age, and ethnicity. The 17 regions of Kazakhstan and the cities of Astana, Almaty, and Shymkent were identified as self-representing strata. The sample size consisted of 2,000 respondents interviewed through face-to-face street surveys using a tablet-based questionnaire (CAPI) [4].

– The expert survey involved 102 participants, including scholars and experts in IT technologies; representatives of executive and local government bodies responsible for digital transformation; managers of various organizations and companies with experience in digital projects; employees of research institutes (culturologists, psychologists, sociologists); university lecturers; IT specialists; bloggers; journalists; and SMM managers. The survey was conducted through semi-structured telephone interviews using a tablet-based questionnaire (CAPI) [5].

– The participants of 26 focus groups conducted in five regions of the Republic of Kazakhstan (one city and one suburb/village in each region) included:
• youth (18–28 years old, unmarried, without children)
• parents of underage children (22–35 years old)
• representatives of various ethnic groups
• practicing Christians (leading a religious lifestyle, regularly attending worship services and engaging in prayer)
• practicing Muslims (leading a religious lifestyle, regularly attending worship services and performing namaz) [6].

The subject of the study was the examination of Kazakhstani citizens' attitudes toward the development of the digital society, as well as the assessment of engagement, influence, risks, and opportunities related to ICT and AI in various areas of activity.

Results

Contours of Kazakhstan's Digital Readiness
Kazakhstan has been included in the structure of the Network Readiness Index (NRI) since 2022. The index reflects a country's position based on four main parameters and twelve subcategories, which are not static. The integral indicators of digital readiness for the period 2022–2024 show that Kazakhstan has shifted from the 58th to the 61st position. While three parameters (technology, people, and impact assessment) demonstrate a decline, one parameter (governance assessment) shows improvement (Table 1).

Table 1. Kazakhstan's NRI ranking in comparative measurement by main categories in 2022–2024 (compiled from sources) [7,8,9]

Year	Rating	Place	Technology	People	Management	Influence
2022	89,0	58	74	49	55	65
2023	73,75	58	79	49	54	55
2024	50,2	61	81	53	53	66

The dynamics of Kazakhstan's network readiness across twelve subcategories indicate a stable level of public trust in the digital society and demonstrate progress in parameters related to quality of life, state policy evaluation, public engagement, and inclusiveness. However, the indices show a decline in areas such as governance, future technologies, business development, economy, sustainable development goals, and process content (Figure 1).
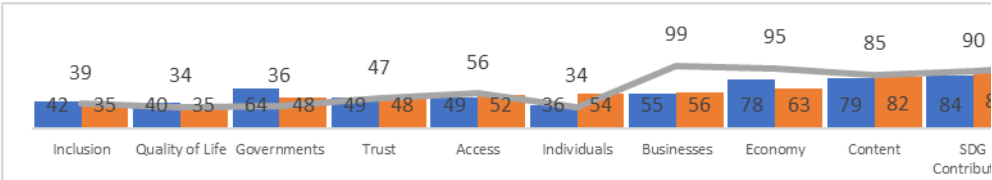

Figure 1. Kazakhstan's Network Readiness Index (NRI) rating in comparative measurement by subcategories in 2022–2024 (compiled by the authors based on sources) [7,8,9]

Domestic experts believe that digitalization in Kazakhstan affects various sectors of activity to different extents, and that the level of development of the digital society can be assessed as ranging from medium to below medium. When compared with global trends in the development of high-tech societies, 16% of experts classify Kazakhstan's digital development as high, 68% as medium, and 16% as low [4].

According to the Government AI Readiness Index for 2023, presented by Oxford Insights, Kazakhstan ranks 72nd among 193 countries. The identified strengths include data accessibility, digital potential, and the adaptability of the legal framework to digital business models. The weaknesses involve the absence of a strategic vision, insufficient technological maturity, underdeveloped infrastructure, low innovation capacity, and limited human capital. Kazakhstan's strategic document, the Concept for the Development of Artificial Intelligence for 2024–2029, proactively formulates a new national idea – Generative Nation [3].

Information and Communication Technologies (ICT) are applied across all areas of activity, including education, healthcare, public administration, and the service sector. The e-government platform eGov.kz provides more than 1,076 types of services and 100 additional digital solutions. Most services are available online, with 86% accessible through the mobile application eGov Mobile. Services are provided in two languages – the state language, Kazakh, and the official language, Russian.

To implement the objectives for AI development, in 2025 Kazakhstan launched the most powerful supercomputer in Central Asia, based on NVIDIA H200 graphics processors, with a performance capacity of approximately 2 exaflops. The system is designed to accelerate

the digital economy and is accessible to startups, universities, research institutions, and companies working in the fields of artificial intelligence and high-performance computing. The Kazakh National AI Platform has become a major technological resource within the sovereign AL-infrastructure of the country and the region.

Engagement in digital practices: the Human factor

The general perception of digitalization, as well as attitudes toward ICT and AI in both mass and specialized public consciousness, was studied within the context of the current state and developmental trends of the digital society [4]. The analysis shows that all generations have experience with the Internet and possess the knowledge and skills to use ICT. Most commonly, this experience manifests (in descending order of application) in the following areas: communication and social interaction, leisure and entertainment, professional work, household management, education, social activities, and political engagement (Figure 2).

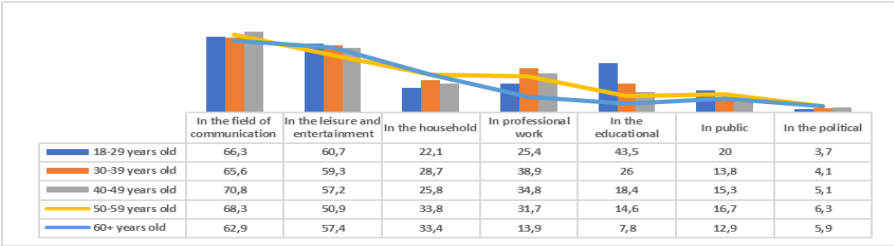|	In the field of communication	In the leisure and entertainment	In the household	In professional work	In the educational	In public	In the political
18-29 years old	66,3	60,7	22,1	25,4	43,5	20	3,7
30-39 years old	65,6	59,3	28,7	38,9	26	13,8	4,1
40-49 years old	70,8	57,2	25,8	34,8	18,4	15,3	5,1
50-59 years old	68,3	50,9	33,8	31,7	14,6	16,7	6,3
60+ years old	62,9	57,4	33,4	13,9	7,8	12,9	5,9

Figure 2. Experience of Internet use across different areas of activity (population, age, N=2000, %)

The digital literacy of the population in various spheres is unequal and clearly insufficient for both professional and educational activities (Figure 3). Kazakhstani citizens demonstrate a critical attitude toward their own digital competencies: 54% of respondents report having basic skills – that is, an intermediate level of Internet proficiency, occasionally encountering difficulties. Meanwhile, 29% assess their skills as high or very high. A total of 53% of respondents expressed interest in receiving Internet use training, and 26% would like to advance their knowledge to the level of an experienced user by studying specialized software programs.

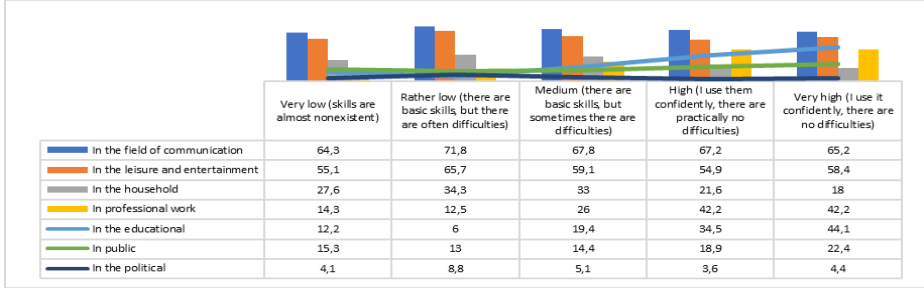|	Very low (skills are almost nonexistent)	Rather low (there are basic skills, but there are often difficulties)	Medium (there are basic skills, but sometimes there are difficulties)	High (I use them confidently, there are practically no difficulties)	Very high (I use it confidently, there are no difficulties)
In the field of communication	64,3	71,8	67,8	67,2	65,2
In the leisure and entertainment	55,1	65,7	59,1	54,9	58,4
In the household	27,6	34,3	33	21,6	18
In professional work	14,3	12,5	26	42,2	42,2
In the educational	12,2	6	19,4	34,5	44,1
In public	15,3	13	14,4	18,9	22,4
In the political	4,1	8,8	5,1	3,6	4,4

Figure 3. Assessment of user skills in various areas of Internet use (population, sample, N=2000, %, 2024)

The potential of digitalization is utilized to a greater extent by high-income population groups: they acquire and master digital opportunities and tools more effectively and have access to a wider range of channels and technical means for interaction with the digital environment. This situation reflects one of the key factors contributing to unequal access. Alongside economic inequality, the categories of unequal access include regional, settlement-based, age-related, and educational disparities.

Perception and understanding of AI: Awareness, Experience, and Evaluation

The mass survey of Kazakhstani citizens revealed a paradoxical situation in which the overwhelming majority of the adult population are active users of ICT across various domains, yet report a low level of awareness regarding AI technologies (Figure 4). This contradiction can be explained by insufficient understanding of the mechanisms underlying digital environments, which in turn gives rise to humanitarian risks.
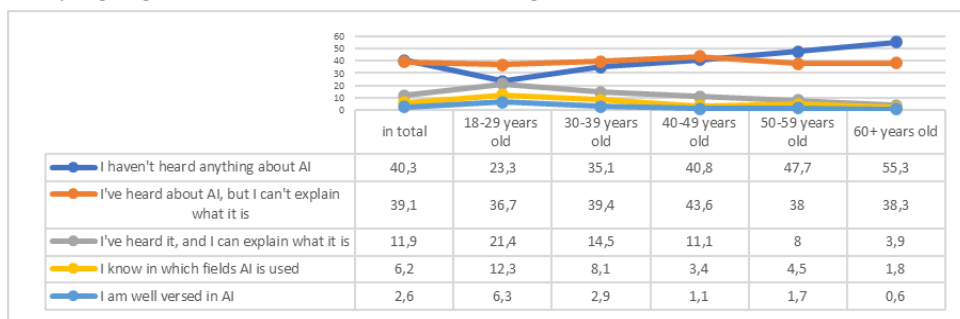
	in total	18-29 years old	30-39 years old	40-49 years old	50-59 years old	60+ years old
I haven't heard anything about AI	40,3	23,3	35,1	40,8	47,7	55,3
I've heard about AI, but I can't explain what it is	39,1	36,7	39,4	43,6	38	38,3
I've heard it, and I can explain what it is	11,9	21,4	14,5	11,1	8	3,9
I know in which fields AI is used	6,2	12,3	8,1	3,4	4,5	1,8
I am well versed in AI	2,6	6,3	2,9	1,1	1,7	0,6

Figure 4. Distribution of responses to the question: "How aware are you of AI technologies?" (population, age, N=2000, %, 2024)

The study identified a clear trend: respondents with higher levels of education use AI technologies several times more frequently than those with lower educational attainment (Figure 5). This situation highlights the urgent need to enhance digital culture and literacy within the national education system.
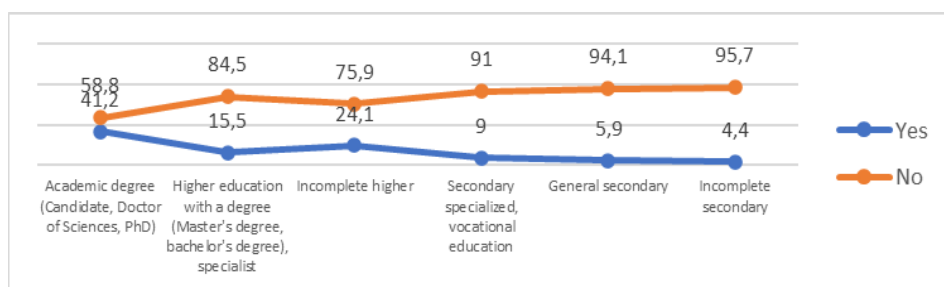

Figure 5. Distribution of responses to the question "Have you personally used AI?" (population, education, N=2000, %, 2024)

Participants of the focus groups representing the younger generation highlighted a wide range of possibilities for using AI tools.

"Intelligence shows you where to find information. The information that ChatGPT can find for you in seconds might take you several days to search for yourself." – Beskaragai village (Abai Region), youth aged 18–25.

"I forgot the name of that artificial intelligence system, unfortunately, but this AI can create music. That is, you can enter text – meaning lyrics – for the music, then choose a genre, and it will generate everything for you. You just specify certain words or a story, the topic of the song, and it will generate it automatically. You can even set random genres, and it will produce several versions – the music is ready." – Semey city, youth aged 18–25.

Open access to various educational resources, according to the young focus group participants, is the most important advantage of information technologies compared to traditional learning tools. The opportunity to use audiobooks and video materials helps them better comprehend and retain information.

"You can develop yourself in the direction you need, because there are many resources and video lessons available on the Internet." – Beskaragai village (Abai Region), youth aged 18–25.

"It is much easier to perceive new information through visualization, especially in education – through 3D models and presentations." – Shymkent city, youth aged 18–25.

"The ability to receive information in other forms, for example, through audio." – Semey city, youth aged 18–25.

"I think that if you want, you can find everything you need on the Internet to learn and grow. And often the information is completely free. You can even take it from a pirate site – the main thing is to understand where and how to search." – Semey city, youth aged 18–25.

Assessment of the impact of new technologies

The risks associated with the rapid development of the digital society are being studied by philosophers, sociologists, political scientists, psychologists, and legal scholars. These risks are linked to insufficient knowledge of the broader context of digitalization, a lack of developed legal awareness, and the absence of well-formed communication psychology skills. In an era of expanding hybrid reality, every ICT user requires knowledge and competencies in digital security.

Among the negative consequences of digitalization for individuals and Kazakhstani society as a whole, experts highlight several humanitarian and political risks:

• The real lives of people are increasingly being replaced by virtual ones, accompanied by a growing influence of social networks (72%);

• The virtual environment exerts a stronger impact on how people shape their views and beliefs, both religious and non-religious (66%);

• A significant part of interpersonal communication is being transferred into virtual space (57%);

• Information technologies and digital capabilities are being used as tools to exert influence on state sovereignty (55%);

• The influence of bloggers and opinion leaders on public consciousness is increasing (54%);

• The administration of electronic resources and the state are unable to effectively control discourses in social media (54%);

• The desire of individuals to openly display their private lives on social networks remains high (51%) [5].

In the general assessment of AI's impact on society, younger respondents were twice as likely (67.9%) as older generations (32.8–36.5%) to view its influence positively. Notably, the share of responses under the category "I find it difficult to answer" remains high across all age cohorts – from 18.4% among those aged 18–29 to 45.7% among respondents over 60. These indicators reflect the current state of public awareness and engagement, and, most importantly, the absence of a clear and consistent understanding of the place of AI in contemporary life and personal experience (Figure 6).
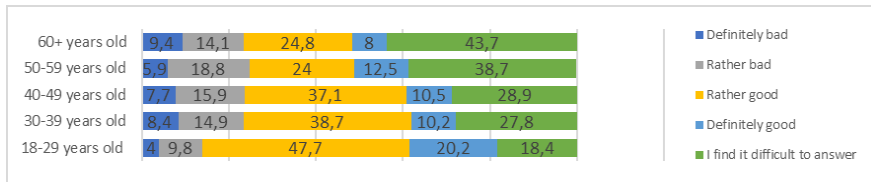

Figure 6. Assessment of the impact of AI on social development (population, age, N=2000, %, 2024)

Respondents identify the advantages of using AI in several key areas: a) utilitarian benefits (convenience, speed, resource efficiency); b) liberation of human potential from routinization and health risks (overcoming monotonous labor and excluding humans from harmful and hazardous working conditions); c) intellectual operations (data analysis and generation of conclusions); d) elimination of psychological factors (fatigue, emotional instability, etc.) (Figure 7).

Modern students cannot imagine their lives without information technologies, recognizing that life without them would be isolated and incomplete:

"Since we are already used to it, and since technology has been developing for a long time, it would now be much harder for us to live without it." – Beskaragai village (Abai Region), youth aged 18–25.

"If the Internet connection disappears, we will fall behind the world, because even the news will not be available to us. We will be left behind everything that is happening." – Shymkent city, youth aged 18–25.

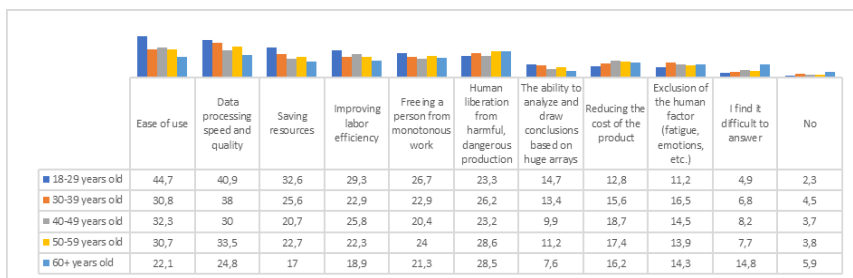|	Ease of use	Data processing speed and quality	Saving resources	Improving labor efficiency	Freeing a person from monotonous work	Human liberation from harmful, dangerous production	The ability to analyze and draw conclusions based on huge arrays	Reducing the cost of the product	Exclusion of the human factor (fatigue, emotions, etc.)	I find it difficult to answer	No
18-29 years old	44,7	40,9	32,6	29,3	26,7	23,3	14,7	12,8	11,2	4,9	2,3
30-39 years old	30,8	38	25,6	22,9	22,9	26,2	13,4	15,6	16,5	6,8	4,5
40-49 years old	32,3	30	20,7	25,8	20,4	23,2	9,9	18,7	14,5	8,2	3,7
50-59 years old	30,7	33,5	22,7	22,3	24	28,6	11,2	17,4	13,9	7,7	3,8
60+ years old	22,1	24,8	17	18,9	21,3	28,5	7,6	16,2	14,3	14,8	5,9

Figure 7. Assessment of positive factors in AI development (population, age, N=2000, %, 2024)

Focus group participants also noted the advantages of new ICTs in such areas as education, self-development, community formation, and entertainment. The

possibilities of distance learning and completing homework through educational portals, paid online courses for improving professional skills and acquiring new knowledge, free video lessons on YouTube, and language learning with AI-based tutors are regarded as undeniable benefits. New technologies not only improve living standards, contributing to personal and professional growth, but also enable individuals to stay informed about social issues and participate in charitable initiatives, thereby fostering the development of social responsibility.

Social networks and video platforms (Instagram, TikTok, and YouTube) provide opportunities for entertainment and leisure.

"I believe that, apart from self-development through online resources, one major advantage is traveling. It broadens your horizons and helps you meet new people. You begin to understand different mentalities, and this opens new doors to various opportunities. Therefore, I tend to believe that it helps to change one's mindset." – *Kabanbai Batyr village (Akmola Region), youth aged 18–25.*

ICTs have become deeply integrated into the everyday life of the population, including children. Every citizen of Kazakhstan becomes a digital individual from the moment of birth. The documentation of a person's biography begins with the assignment of an Individual Identification Number (IIN) and the issuance of a digital birth certificate. At later stages of life, starting from preschool age, Kazakhstani citizens become active participants in the digital society and are present in digital space often unconsciously.

Many parents participating in focus group discussions expressed significant concern about the risks of the virtualization of life for children, adolescents, and young people. Information technologies have become an inseparable part of children's daily lives, and parents acknowledge that this helps children more easily adapt to the modern digital environment, acquire new knowledge, and develop skills..

Immersion of children into virtual reality (as observed from parents' personal experience) often leads to social isolation, loss of direct communication skills, and the emergence of fear and discomfort in real-life interaction. Increased aggressiveness and tendencies toward antisocial behavior are also reported.

"The child becomes so absorbed in the game that he doesn't even respond when called by name. This shows how deeply he is involved. All the aggression and emotions he experiences in the game can later be directed toward those around him." – *Shymkent city, parents of underage children.*

"Many games contain violence, drugs, and killings. For example, in GTA, they get into a car and run people over. You understand that it's just a game, but the child doesn't. Killing or hitting someone might seem normal to them. That's why I think it's necessary to explain to the child that it's just a game – and that such behavior is unacceptable in real life." – *Shymkent city, parents of underage children.*

"Some children become antisocial. They don't know how to behave in society or how to communicate. They can only make contact in the virtual world, and when they need to interact in real life, they face a psychological barrier." – *Semey city, parents of underage children.*

Alongside a lack of financial literacy, children often make uncontrolled virtual purchases and can fall victim to fraudulent schemes. Some participants reported incidents where children used their parents' bank cards without permission to make in-game purchases.

"A few years ago, my child was playing an online game that required transferring money. He took my bank card, linked it to his phone, to the game, and to his Google

account. We didn't notice it immediately. Naturally, when we found out – we punished him by banning access." – Beskaragai village (Abai Region), parents of underage children.

"Children also buy these... game donations. So we have to block all cards from online purchases. You can still explain to a schoolchild that it's wrong. But the younger ones? They don't yet understand what they're doing." – Astana city, parents of underage children.

Children's dependence on gadgets requires constant parental supervision.

"Although schools are supposed to conduct lessons on Internet safety, the main responsibility still lies with parents. They must educate and protect their children in the digital space. The problem is that we, as parents, have only recently encountered this issue ourselves – we also need to be educated on safe use of information technologies." – Semey city, parents of underage children.

"The state should more actively regulate access to potentially harmful websites and ensure children's safety on the Internet, protecting them from destructive content." – Lenger city (Turkistan Region), parents of underage children.

The integrated position of parents is reflected in the following proposal:

"I believe that Kazakhstan needs a specialized law to regulate content for children. There should be a separate state body that monitors and ensures the proper quality of online content for children." – Shymkent city, parents of underage children.

When assessing the positive and negative impacts of ICT on society, experts emphasized the predominance of positive outcomes, noting their predictability as a consequence of civilizational progress. ICT contributes to technological advancement and improvement of living standards (98.0%), to the harmonious development of personality and expansion of opportunities for self-realization (94.1%), and to achieving equality in the digital and network environment (81.4%). ICT also facilitates better communication between people of different cultures, fosters tolerance, and helps form a digital identity actively engaged in communication through digital means (80.4%). Furthermore, it contributes to improving quality of life and life expectancy for the population at large (65.7%).

Among the negative consequences, experts noted the emergence of new risks for political governance (72.6%), the rise of new social and humanitarian challenges (58.8%), a decline in human empathy and interpersonal compassion (50%), an increase in social inequality in real life (43.1%), a reduction in the ability of society and individuals to care for and support one another (34.3%), and growing divisions in communication along cultural lines, which may increase the likelihood of ethnic conflicts (33.3%). The identification and ranking of these risks are primarily associated with the political and social spheres [5].

Social, Humanitarian, and Ethical Issues in the Application of Digital Technologies

For successful adaptation to the digital society, participants emphasized the importance of developing several essential skills:

1. Technical literacy and rapid adaptation to new technologies, including the ability to use phones, computers, and various applications.

2. Financial literacy, particularly regarding online purchases and credit use.

3. Fact-checking skills, i.e., the ability to distinguish reliable information from false or misleading content, which requires the development of critical thinking.

4. Time management skills and the ability to avoid dependence on Internet technologies.

"Probably, the first thing is to understand the technology you are using. Because if you don't know what you're doing, just pressing buttons is not good. For example, you should know how to use your phone or laptop. I think you need to understand every technology you interact with." – Beskaragai village (Abai Region), youth aged 18–25.

"Digital literacy means knowing how to use the Internet and other messengers. For example, the older generation mostly doesn't know how to use technology. They often ask simple things like how to send photos on WhatsApp – that already shows digital illiteracy. Digital literacy is about being able to use information properly." – Shymkent city, youth aged 18–25.

"For example, the same Kaspi app. It's very easy there to take a loan or an installment plan. When a person is impulsive or excited, they might do it without thinking, because it's all so simple. Without paying attention, they can easily get themselves into debt." – Semey city, youth aged 18–25.

"I think what's mainly needed is filtering. People should know how to filter information, use only what's necessary, and stay focused in one direction." – Shymkent city, youth aged 18–25.

Discussing access to information technologies, participants in focus group discussions concluded that although information is accessible to everyone in the modern world, not every individual is capable of using this opportunity effectively.

Informants expressed negative expectations about a future based solely on information technologies. These concerns are associated with the following factors:

1. Reduction of direct communication and empathy toward others, as excessive use of information technologies leads to a deficit of real-life interaction and emotional connection. According to focus group participants, this tendency will only continue to grow over time. Most respondents perceive this problem as an inevitable outcome:

"I think communication between people will only decrease. But that's normal. It all depends on the person – whether they want to lose human contact or not." – Beskaragai village (Abai Region), youth aged 18–25.

"The transition to digitalization is a period of trust in your phone. You trust technologies and the information you see, while ordinary communication with people declines." – Kabanbai Batyr village (Akmola Region), youth aged 18–25.

2. Psychological problems

According to participants, the younger generation may face psychological issues in the future due to their dependence on information technologies. At the same time, the participants themselves do not consider themselves part of the dependent group.

"I think something will go wrong with the new generation. They will be more dependent and may face psychological problems. We might still hold on, but I can't say the same for the younger ones." – Beskaragai village (Abai Region), youth aged 18–25.

"When we gather as a family, everyone is on their phones. People spend less time communicating with their loved ones. Some put on headphones and listen to music, paying no attention to those around them." – Beskaragai village (Abai Region), youth aged 18–25.

3. Growing dependence on public opinion

Social networks intensify dependence on public approval and likes, which can negatively affect mental health. Frequent comparison with other users leads to feelings of inadequacy and stress.

4. Post-apocalyptic or cyberpunk-like future

Young people express concern that excessive technologization may lead to the degradation of human moral values and the emergence of a society where humans are partially replaced by machines and robots.

Ethical Codes of the Internet

The ethics of communication in the online space are often shaped by the anonymous nature of the Internet, which, on one hand, provides freedom of expression, but on the other, frequently leads to impunity and toxicity. Behavioral norms in online communication are largely set by users themselves. Respondents believe that the regulation of behavioral rules and norms in the Internet environment is necessary, yet difficult to enforce due to the inherent anonymity of the medium.

Some respondents argue that rules within online communities develop naturally and that the main focus should be on maintaining respect and positive interaction.

"To prevent your private messages from being leaked, you need to behave differently in communication. I think it will become more difficult to remain anonymous with each passing year, while responsibility for one's words and actions will increase." – Kabanbai Batyr village (Akmola Region).

To create a friendly atmosphere, it is important, on the one hand, to cultivate social tolerance and, on the other, to establish clear legal frameworks. A person must understand that even in the online space, they have not only rights but also responsibilities for their actions.

At the same time, respondents noted a growing trend of aggression in the Internet environment in recent years, particularly in comments under news articles and social media posts. Users have become less restrained in their expressions, displaying intolerance and impatience toward differing opinions. Overall, the atmosphere of online interaction has become less friendly.

The introduction of ethical norms for online behavior without governmental or legal oversight is considered ineffective. State measures are needed to limit negative content and block inappropriate comments. Ethical rules of conduct in online communities should be grounded in clear legal rights and responsibilities.

Respondents perceive the negative impact of ICT development primarily in the transformation of values among young people, who spend most of their lives in online environments. Within these digital spaces, value systems and cultural codes are being reshaped under the influence of "foreign" content. Popular bloggers, trends, and viral videos significantly affect the desires and behavior of audiences, shaping contemporary needs and ideals that differ from national traditions.

"Now culture and history are being lost. With digitalization and globalization, teenagers start copying Western styles. They wear clothes from Zara and certain sneakers because everyone else does. This is the result of Western cultural influence and globalization." – Semey city, youth aged 18–25.

The influence of digitalization as a globalizing trend contributes to the diminishing importance of traditional moral values, including family values, and to the rise of individualism.

Problem-Thematic Context of the AI Paradigm

Discourse analysis of expert responses to open-ended questions and opinions from focus group participants made it possible to identify the most relevant issues of digital development as perceived by Kazakhstan's population, and to reconstruct the cartography of key challenges in the process of digital transformation (Table 2).

Table 2. Cartography of the main problems of Kazakhstan's digital transformation process

Problem	Risks	Impact	Solutions
Ensuring cybersecurity	Violation of the principles of AI system security and confidentiality	Leakage of personal data, fraud, infringement of human and legal entities' rights to information privacy	Define, at the legislative level, the degree of responsibility for the protection of personal data. Educate the population in critical thinking, informed decision-making, and the ability to recognize threats when using ICT and AI.
Differentiated education in digital literacy and AI product recognition	Inadequate level of digital competence among the population	Decline in the intellectual potential of the nation, lack of mechanisms for identifying citizens as competent subjects of the information environment	State-supported educational and awareness programs (from basic to advanced levels) to ensure the unhindered development of IT technologies and the use of AI, as well as mechanisms for interaction with virtual (VR) and augmented reality (AR).
Overcoming digital inequality and ensuring equal access to the digital environment, tools, and technologies	Differentiation and confrontation in society based on digital accessibility and user competence	Decline in social consensus and inclusiveness	Implementation of state measures to provide digital infrastructure and educational programs for various population groups to improve interaction with AI.
Lag and imperfection of legislation for AI development	Inadequate legal regulation of digital development; violation of citizens' and businesses' rights	Legal nihilism, ethical conflicts	Systematic development of legislation covering all spheres of AI application to ensure effective regulation.
Adaptive regulation of digitalization and AI technologies in various sectors of the economy and social life	Lag behind the pace of economic digitalization, uneven distribution of digital resources across activities	Slowing of societal development, human capital stagnation, and reduced national competitiveness	Implementation of cross-sectoral and interdisciplinary approaches for the systemic integration of AI.
Advancement of digitalization in state, executive, quasi-state, and private sectors	Bureaucratic barriers due to the lack of digitalized processes, hindering the use of AI technologies	Improvement of technologies and implementation of AI algorithms for efficient interaction and barrier reduction	Development of digital process algorithms in public administration, business environments, and key sectors such as healthcare, education, and public services; creation of cross-sectoral service platforms.

Development of mechanisms to limit the negative impact of digitalization and AI products	Spread of destructive content via ICT and AI	Promotion of anti-value (counter-normative) behavior models; imbalance between real and digital environments	Development and dissemination of alternative online content with ethically approved, value-based messages that reinforce Kazakhstani moral identity and ethical resilience.
Training of IT specialists	Slowed pace, quality, and scale of digital development	The country's lag in digital competition, decline in the intellectual potential of the Kazakhstani nation	A flexible system of training and retraining specialists to align market needs with the pace of digital society, ICT, and AI service development.
Reproduction of adequate digital infrastructure	Insufficient technological development: low Internet speed, unstable connection, shortage of IoT technologies, data transfer errors and failures; lack of domestic digital products/ technologies	Digital sovereignty of the state, digital inequality among citizens	Expansion of the fiber-optic communication system, production of electronic chips, and creation of favorable conditions and incentives for the development of domestic digital products and technologies.
Total digital control of individuals by the state and external actors (countries, organizations, corporations)	Violation of privacy and unauthorized intrusion into private life	Violation of human rights, restricted access to information, digital reformatting of identity, and imposition of behavioral algorithms	Development of legislation protecting personal and digital human rights.
Position in the digitalization market	Lack of free competition among digitalization agents (operators, service providers)	Insufficient regulatory mechanisms in the digitalization market	Reduction of the state's share in digital service provision; establishment of transparent financing mechanisms for structures engaged in digitalization.
Digitalization and AI implementation leading to labor market displacement	Decrease in the human factor in the economy, potential for social unrest	Lack of systemic analysis of digital transformation impacts on the labor market	Analysis of the feasibility and justification of transformation processes; development of technologies and algorithms adapted to the national context.

The risks of digitalization in Kazakhstani society are multifaceted, manifesting in cybercrime, the erosion of cognitive and social stability (due to misinformation, technostress, and addiction), as well as the danger of external control over individuals and targeted manipulation aimed at reprogramming their interests, beliefs, and

behavioral models. While digitalization and AI offer unprecedented opportunities for social progress, their uncontrolled proliferation can exacerbate inequality, undermine trust, and pose threats to individual well-being, as well as to social and political stability.

Digitalization requires not only technical skills but also an accompanying user culture. Recognition of this necessity has led to changes in the national system of compulsory secondary education: beginning in the 2025/26 academic year, the subject "Informatics and Artificial Intelligence" will be taught from grades 1 through 11. All children and adolescents will receive foundational knowledge and develop digital culture skills, including training in digital safety. Digital identity and digital culture at the personal level serve as key factors of competitiveness at later stages of socialization, in professional environments, and in everyday life. Therefore, in addition to educational programs for children, it is essential to provide specialized training and retraining for the active (working) population, as well as accessible educational and awareness resources for all categories of citizens.

Discussion

The study was conducted within an interdisciplinary framework for understanding the digitalization of Kazakhstani society and aligns with the methodological positions of other scholars who have substantiated the subject of study in a similar contextual manner [10]. The philosophical comprehension of the digital world [11], digital reality, ICT, and AI serves as an ultimate matrix for refining all concepts that describe the digital society and have a smaller scope of conceptualization.

The analysis of key trends in digitalization, emerging problems and contradictions, and their theoretical explanations – when compared with both international and national experiences – indicates the synchronization of processes and their correspondence with global trends [12], as confirmed by the results of this study.

The theoretical propositions previously put forward as hypothetical issues – regarding the relevance of ethical contexts and the need for detailed and specialized development of digital legislation [13] – have been verified in this research through public perception, expert evaluations, and group discussions. Informants focused their attention on real tendencies of contradictory digital environment development, which require ethical and legal regulation of emerging relations.

The technological challenges of the digital transition, as interpreted by qualified Kazakhstani respondents (experts working in the IT sector), are synchronized and correlate with the analysis of causes and proposals for improving state governance policy, as substantiated by national scholars [14]. The growing influence of the digital economy within the ecosystem is confirmed by current conditions of economic development and expert forecasts [15]. The decline in international rankings of digital readiness in the economic dimension is an objective indicator reflecting the structural difficulties of modernization-oriented transformation of the information sphere [6].

The issues of inequality, manifested as tangible disproportions in the process of digitalization, were identified in the sociological study, and their evident nature is confirmed by theoretical conclusions that conceptualize digitalization as a modeling system of social stratification [16].

It should be acknowledged that the state acts as the main driver of digitalization [17] and its responsible operator, a role that is highly evaluated and consistently maintained in international digital readiness rankings [4,5,6].

The analysis of the research results demonstrates that virtual (digital) identity can acquire a self-sufficient character in the process of human self-identification. This does not contradict but rather confirms the complex interactions between different worlds, the real and the virtual [19], and their capacity to transform perceptions and ideals, influencing beliefs and values.

For Kazakhstan, digitalization has become both a condition and a principle, as well as an approach within the framework of catch-up modernization. It has necessitated the choice of a paradigm for the digital society, the scientific and theoretical comprehension of this process in its various manifestations, and the practical development, adoption, and implementation of state policy [20].

Conclusions

The dynamics of digital society development in Kazakhstan are determined by the global trends of the modern era, while the factors driving intensive national digitalization are closely linked to geopolitical processes and the growing pace of technological competitiveness. The rapid evolution of the digital society carries numerous risks, which are being studied by philosophers, psychologists, and legal scholars. Society is forming an ethical paradigm for digital interactions, while the state is developing legislation that protects and safeguards citizens' rights in the digital environment.

The implementation of AI algorithms is progressing faster than society's and individuals' ability to comprehend their potential and risks, as well as to master the technologies of their use. The pervasive nature of digital risks – from information overload and fake news to technostress and dependence on digital reality – reflects the insufficient reflective capacity of a large part of the population to critically process information and resist external influences. The population requires education on how to counter manipulative influences enabled by new technologies, how to build constructive communication in virtual reality, and how to proactively develop personal skills for maintaining psychological well-being and balance.

Measuring the progress and impact of digitalization requires a multifaceted approach, based on various international indices and national performance indicators. Understanding and promoting the digital society encompass not only technological capabilities but also social and humanitarian transformations occurring under the influence of the Internet, digital technologies, and AI.

Although the conditions of technological modernization are rapidly transforming all forms of reality, research on AI in the context of Kazakhstani realities has not yet become a distinct subject of interdisciplinary study. The problem-oriented discourse on understanding the nature of ICT and the role of AI in the lives of Kazakhstani citizens has revealed a complex set of interrelated circumstances, factors, conditions, causes, and challenges of both technological and socio-humanitarian nature. These issues, to varying degrees, remain in the focus of attention of the state and the stakeholders who are translating the model of the digital society into reality.

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Жасанды интеллект жаңарту парадигмі ретінде: шарттар, қабылдау және тәуекелдер (пәнаралық көзқарас)

Аңдатпа. Жасанды интеллект (ЖИ) мәселесі ғылыми, қоғамдық-саяси дискурс-тарда және күнделікті өмір тәжірибесінде өзекті тақырыптық күн тәртібіне айналды. Цифрландырудың қарқынды дамуы мен жасанды интеллекттің кеңінен таралуы қоғамды, экономиканы және жеке өмірді түбегейлі өзгертіп жатыр. ЖИ парадигмасы тек технологиялық емес, сонымен қатар әлеуметтік-гуманитарлық өлшемдерде де көрініс табатын пәнаралық ғылыми дискурс аясында қалыптасады. Қоғам өмірінің барлық салаларына цифрлық технологияларды енгізу әлеуметтік-мәдени, экономикалық, саяси, психологиялық, экологиялық, құқықтық, этикалық аспектілерде түрлі мәселелер спектрін туындатады. ЖИ технологияларының жеке тұлғалық өлшемдерінде өмір сүрудің қолайлы жағдайларын қамтамасыз етіп қана қоймай, сондай-ақ тұлғалық бірегейлікке айтарлықтай әсер ететін адамның цифрлық шындыққа тәуелділігін қалыптастырады. Қоғамның цифрлық трансформациялануы мемлекет тарапынан тәжірибелік алгоритмдерді әзірлеу мен жүзеге асыруды, мұқият талдауды талап ететін осы уақытқа дейін болмаған мүмкіндіктермен қатар сын-қатерлер мен қауіптерді де туындатады.

Мақалада Қазақстандағы цифрландырудың әлеуметтанулық өлшемдерінің нәтижелерін түсіндірудің пәнаралық тәсілі және ғылыми, ресми дереккөздерге дискурс-талдау жүргізу негізінде ЖИ ұлттық парадигмасын қалыптастырудың өзекті контексттері ұсынылған.

Түйін сөздер: жасанды интеллект (ЖИ), ақпараттық-коммуникациялық технологиялар (АКТ), Қазақстан, жаңғырту, тәуекелдер, цифрлық қоғам.

Джаманбалаева Ш.Е,, Бурова Е.Е., Адамиди А.
Искусственный интеллект как парадигма модернизации: условия, восприятие и риски (междисциплинарный подход)

Аннотация. Проблематика искусственного интеллекта (ИИ) становится актуальной тематической повесткой в научном, общественно-политическом дискурсах, в практике повседневности. Стремительные темпы цифровизации и распространение ИИ кардинально изменяют общества, экономики и индивидуальную жизнь. Парадигма ИИ вырабатывается в междисциплинарном научном дискурсе, который распредмечивается не только в технологическом, но и социально-гуманитарном измерениях. Интеграция цифровых технологий во все сферы жизнедеятельности социума порождает спектр проблем в социально-культурном, экономическом, политическом, психологическом, экологическом, правовом, этическом аспектах. В личностном измерении технологии ИИ обеспечивают комфортные условия существования и одновременно порождают созависимость человека от цифровой реальности, которая способна существенно воздействовать на идентичность. Цифровая трансформация общества наряду с беспрецедентными возможностями инициирует вызовы и риски, требующие тщательного анализа, разработки и реализации практических алгоритмов государством.

В статье на основе дискурс-анализа научных и официальных источников, междисциплинарного подхода к интерпретации результатов социологических измерений цифровизации в Казахстане представлены актуальные контексты формирования национальной парадигмы ИИ.

Ключевые слова: искусственный интеллект (ИИ), информационно-коммуникацион-ные технологии (ИКТ), Казахстан, модернизация, риски, цифровое общество.